

Air Transport Association

May 5, 2003

Docket Management System  
U.S. Department of Transportation  
Room Plaza 401  
400 Seventh St., SW  
Washington, DC 20590-0001

**Re: Docket No. FAA 1999-5401**  
**Aging Airplane Safety Interim Final Rule and Request for Comments**  
**Advisory Circulars 120-XX, 91-56B, and 91-60A**  
**67 Fed. Reg. 72726 (December 6, 2002)**

Dear Sir or Madam:

The Air Transport Association of America, Inc. ("ATA") submits these comments in response to the **Aging Airplane Safety Interim Final Rule** and request for comments ("IFR"), and related Advisory Circulars AC 120-AAR, "Aging Airplane Inspections and Records Reviews," and AC 91-56B, "Continuing Structural Integrity Programs for Airplanes." ATA is the principal trade and service organization of the U.S. scheduled airline industry, and our member airlines account for 95% of the passenger and cargo traffic carried annually by U.S. scheduled airlines.<sup>1</sup> ATA has a unique interest in the outcome of this proceeding as our members currently operate a fleet of 4,652 aircraft, many subject to comprehensive FAA-approved aging aircraft maintenance and inspection protocols. Existing airline maintenance programs will be directly and significantly impacted by requirements in the IFR. In addition, and most importantly, ATA and its member airlines have long supported efforts by the FAA and the industry to improve the airworthiness of aging aircraft.

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<sup>1</sup> Members are: Airborne Express, Alaska Airlines, Aloha Airlines, America West Airlines, American Airlines, ATA Airlines, Atlas Air, Continental Airlines, Delta Air Lines, DHL Airways, Emery Worldwide, Evergreen International, FedEx Corporation, Hawaiian Airlines, JetBlue Airways, Midwest Airlines, Northwest Airlines, Polar Air Cargo, Southwest Airlines, United Airlines, UPS, and US Airways. Associate members are: Aerovias de Mexico, Air Canada, Air Jamaica, KLM Royal Dutch Airlines, and Mexicana.

The IFR governing Part 121 aircraft requires: (a) FAA inspections of all airplanes and their maintenance records to be completed by 2007 for aircraft with more than 24 years in service, by 2008 for aircraft with more than 14 and less than 24 years in service, and staggered inspections for aircraft with less than 14 years in service, with repeat inspections on all aircraft at maximum seven year intervals, and (b) inclusion of damage-tolerance-based inspections and procedures (baseline structure maintenance as well as major repairs, alternations and modifications (RAMs) for the entire airplane) in carrier maintenance programs by December 2007. Airplanes that have not been inspected and maintained pursuant to the final rule will not be permitted to operate.

## I. Executive Summary

ATA and its member airlines appreciate the broad Congressional mandate governing FAA's regulatory efforts in this proceeding.<sup>2</sup> As detailed in these comments, we have fully supported the FAA and the Airworthiness Assurance Working Group ("AAWG") in their joint efforts for more than a decade to address issues relating to the safe maintenance of aging aircraft, and will continue to do so.<sup>3</sup> Likewise, our members will make every effort to comply with the intent and goal of FAA in this IFR. They are committed to implementation of the new aging aircraft protocols and timely compliance with all the proposed requirements for which the necessary processes are available, or will be in the near term, to the carriers and the FAA. A few aspects of the proposed requirements, however, impose significant technical and logistical hurdles for both the carriers and the FAA. For these requirements, we recommend the following processes that facilitate compliance within a reasonable timeframe and provide an equivalent level of safety:

- **Inspections of aircraft and records should be aligned with existing FAA inspection mandates and FAA-approved carrier maintenance programs.** The IFR requires individual aircraft and records inspections in staggered baseline years (beginning in 2007) and at seven-year intervals thereafter. In guidance issued after the IFR, FAA advises that the aircraft inspections must be comparable to a heavy maintenance check, with a minimum 14-day downtime.<sup>4</sup> Neither repeat inspections at seven-year intervals nor the length of the aircraft inspections are mandated by the Aging Aircraft Safety Act. Components of the proposed inspection protocols conflict in this regard with numerous FAA approved maintenance documents and existing aging aircraft inspection programs, and would require unnecessary disruption of and changes to maintenance programs at a significant cost with no added benefit.

**Recommendation:** Initial inspections (aircraft and records) and repeat inspections should be aligned with existing FAA-approved maintenance programs. The inspections will occur at an appropriate maintenance check. As FAA suggests in the IFR, operators

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<sup>2</sup> 49 U.S.C. Section 44717.

<sup>3</sup> The AAWG was known formerly as the Aging Aircraft Task Force; see discussion beginning on page 6.

<sup>4</sup> 67 Fed. Reg. 72761; Supplemental FAA Guidance dated March 10, 2003.

should be permitted to work with their principal maintenance inspectors (PMIs) or Designated Airworthiness Representatives (DARs) to agree on the scheduled maintenance visit that gains access to the largest or most critical portion of the airplane.<sup>5</sup> As FAA acknowledges, this flexibility will ensure full compliance with the inspection requirements in a comprehensive, efficient, and cost effective manner.<sup>6</sup> With such alignments, repeat inspections can be scheduled within the seven-year interval currently proposed.

- **Although the airlines will assist FAA with development of training materials and inspection guidance, compliance dates for inspections of aircraft and records may need to be adjusted.** As indicated, the proposed inspection and maintenance regime requires new processes, techniques, training and inspectors; all are necessary for timely implementation. Although not addressed in the IFR, FAA advises that FAA technical guidance (i.e., incorporating the new damage-tolerance based protocols and inspection guidance) for aging aircraft inspections will not be available, and FAA training will not be completed, until June 2004.<sup>7</sup> With this six-month delay past the effective date of December 8, 2003, it is unlikely that a sufficient number of inspectors can be trained and certified, and inspections completed on the initial category of affected airplanes, by December 2007.

**Recommendation:** The goal of the airlines is to ensure that trained inspectors, with clear inspection procedures, are prepared to begin the inspections on December 8, 2003. The IFR provides for completion of aircraft and records inspections as early as forty-eight (48) months after the effective date of the final rule. As explained more fully below, these inspections must take place at a rate of at least 50 per month beginning December 8, 2003 to complete them by the deadlines. To expedite development of training materials for FAA inspectors, ATA members will offer three prototype aging aircraft for FAA's use as well as assistance from technical experts within the carriers and the AAWG. If, despite the best efforts of the FAA and the carriers, the inspections cannot begin in December 2003, we recommend indexing this requirement to the availability of trained FAA inspectors, with completion of each category of aircraft and records inspections within forty-eight (48) months (identical to the compliance period in the IFR) for airplanes addressed by Section 121.368 (b)(1), and corresponding adjustments for inspections addressed in Sections 121.368 (b)(2) and (b)(3). The nature of the inspections should be aligned with the availability of the required damage tolerance (DT) guidance as explained in the following recommendations.

- **An existing Aviation Rulemaking Advisory Committee (ARAC) should be tasked with development of damage tolerance guidance to fill existing voids.** The IFR

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<sup>5</sup> 67 Fed. Reg. 72730.

<sup>6</sup> 67 Fed. Reg. 72730.

<sup>7</sup> Supplemental FAA guidance dated March 10, 2003.

Preamble states that maintenance programs for the entire aircraft structure and all existing major repairs, assessments and modifications (RAMs) must include damage-tolerance-based inspections and procedures by December 2007. As documented in these comments, there are significant voids in the damage-tolerance (DT) guidance supplied by Original Equipment Manufacturers (OEMs) upon which damage-tolerance-based airline maintenance procedures are predicated. At an FAA public meeting on February 27, 2003, FAA Transport Airplane Directorate (TAD) representatives presented their vision for use of standardized Supplemental Structural Inspection Document (SSID) airworthiness directives (ADs) as a means to support compliance with the IFR.<sup>8</sup> Standardized SSID ADs, with corresponding FAA-approved Inspection Documents and Structural Repair Manuals, can fill the voids in DT guidance. Due to the tremendous resources required, it is our understanding that the OEMs cannot develop the requisite guidance for several years or in the absence of general guidance for airlines, cannot directly perform damage-tolerance assessments for the thousands of individual pre-existing RAMs in a timely manner. It would be inefficient, impractical, extremely costly, and very difficult for individual carriers to develop the requisite aircraft type specific DT guidance, and impossible for them to develop this guidance and implement DT inspection techniques in all the required areas in the near term.

**Recommendation:** ATA supports the TAD proposal for standardizing the SSID ADs with respect to DT inspection programs for the baseline structure and each specific major repair, modification and alteration to the baseline structure.<sup>9</sup> In addition, we support the proposal made at the public meeting by the chairman of the Airworthiness Assurance Working Group (AAWG), an FAA technical group chartered under the Aviation Rulemaking Advisory Committee, with unique expertise and experience developing maintenance practices relating to the airworthiness of aging aircraft. The AAWG requested that FAA task AAWG with development of standard DT approaches and guidance to eliminate an inherently inefficient, piecemeal approach. Rather than the compliance dates proposed in the IFR, aspects of the compliance periods should be indexed to the availability of the requisite technical guidance. Airline maintenance programs can, and should be required to, incorporate required DT assessments for all maintenance of the baseline structure, and all major RAMs to the pressure boundary in accordance with the FAR Part 39 mandates (SSID ADs addressed to baseline structure of aging aircraft), and FAR Section 121.370 (Repair Assessment for Pressurized Fuselages) addressing fuselage repairs. However, for major RAMs outside the pressure boundary and other structure for which damage-tolerance guidance does not exist, the AAWG should be tasked the development of standard approaches for OEMs to use to develop this new DT guidance. If FAA makes this assignment by June 2003, the AAWG will

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<sup>8</sup> "Supplemental Structural Inspection Document (SSID) Standardization Public Meeting," February 27, 2003; (also see <http://www1.faa.gov/certification/aircraft/transport.htm>).

<sup>9</sup> Also see the IFR Preamble page 72738: "However each operator is ultimately responsible for ensuring each of its airplanes has the appropriate inspection programs for the baseline structure, which is designed by the original type certificate holder, and each specific major repair, modification, and alteration to the baseline structure."

strive to complete its work by June 2006, and airlines will strive to incorporate the guidance into their maintenance programs before 2007. At that time, DT assessments could be performed on new repairs; existing repairs could be analyzed on a cycle-based formula that AAWG would provide, similar to provisions of the SSID ADs and the Repair Assessment rule.

## **II. Background**

### ***A. A Review of the Context of the Aging Aircraft Safety Act and the IFR is Useful.***

Prior to discussing our specific recommendations, it is helpful to review the context of the Aging Aircraft Safety Act (the “Act”) and the IFR. The FAA states that the IFR fulfills its regulatory responsibility to meet the requirements of the Act.<sup>10</sup> In assessing this relationship, the circumstances before and after the Act was passed provide interesting insight. Congress passed the Act in 1991, more than twelve years ago, following the 1988 Aloha Airlines event. The Act was passed in tandem with a number of regulatory efforts to focus on issues relating to aging aircraft and to increase FAA’s oversight of airline maintenance programs.

Because these efforts and others were in their infancy, there was no opportunity to see the long-term benefit of these additional, different inspection/maintenance procedures in terms of enhanced aging aircraft maintenance programs. Likewise, there was no way to anticipate the stringent safety measures implemented by FAA and industry to ensure the structural integrity of aircraft after the Act was passed: updates to supplemental structural inspection documents, new rules for repair assessments, corrosion prevention and control programs, damage tolerance-based inspections and procedures, and various airworthiness directives. Airlines today, twelve years after the Act passed, rely on integrated, sophisticated FAA-approved maintenance programs to maintain all aircraft. The FAA and the industry live in a maintenance environment quite different from the one that existed in 1990. Of perhaps equal import is the fact that today the average age of aircraft in the US fleet is twelve years, with only 23 percent of the fleet twenty years or older.<sup>11</sup> In early 1991, prior to the Act’s passage, the average age of aircraft was almost fourteen years and 34 percent of the fleet was twenty years or older<sup>12</sup>.

In passing the Act, Congress reiterated its longstanding desire “to further the highest degree of safety in air transportation and air commerce.”<sup>13</sup> Congress did not mandate the dismantling of existing, time proven FAA-approved maintenance programs directed at aging aircraft or of very successful joint government/industry efforts such as the AAWG. We urge the FAA, in fulfilling its statutory mandate, to recognize today’s comprehensive maintenance regime focused on aging

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<sup>10</sup> 67 Fed. Reg. 72726.

<sup>11</sup> BACK Aviation Solutions fleet database, all U.S. Carriers, commercial jets only, April 4, 2003; in 1991, this database reported an average aircraft age of 13.3 years, with 32.8% of the fleet 20 years or older.

<sup>12</sup> GAO Report, Aging Aircraft Maintenance, Testimony of Kenneth M. Mead, September 17, 1991 (GAO/T-RCED-91-84, p. 9, citing “Airlines with 150 or more aircraft in their fleets as of July 19, 1991”).

<sup>13</sup> 49 U.S.C. Sec. 40101(a)(3).

aircraft that did not exist when the Act was passed. FAA should also recognize the outstanding safety record of the industry in recent years, achieving the goal of no fatal accidents for U.S. airlines or commuters in 2002.<sup>14</sup>

Finally, we appreciate FAA's solicitation of comments as to "how implementation costs for this rule could be further reduced," the development of maintenance regimes "that would provide an equivalent level of safety by limiting the amount of the aircraft opened at any one time," and alternatives to the proposed procedures.<sup>15</sup> The following comments address these issues and more. Although the airlines have historically and will continue to support safety enhancements, these enhancements should be integrated into, and evaluated in conjunction with, existing maintenance programs for aging aircraft. Any rule significantly impacting these programs, as the IFR clearly does, must be thoroughly analyzed to ensure compatibility with these programs.

***B. For over a decade, the FAA and the industry have dedicated substantial technical expertise and resources toward the development of comprehensive aging aircraft maintenance procedures.***

As described in the Preamble's "Background (History)," the efforts of the FAA to address the safety of older airplanes have been underway for more than a decade.<sup>16</sup> The FAA has adopted a policy of mandatory structural modifications and inspections through a series of Airworthiness Directives for an identified group of transport category airplanes that were approaching design-life goals established by each type certificate holder. Corrosion Prevention and Control Programs (CPCP) were developed to supplement existing maintenance requirements, and a methodology was developed to assess airplane structural repairs for damage tolerance. In addition, Supplemental Structural Inspection Documents (SSID) and the Structural Maintenance Program General Guidelines Document were revised. In 1999, a notice of proposed rulemaking (NPRM) entitled "Aging Airplane Safety" was issued as a precursor to this IFR.<sup>17</sup>

Although the Preamble also touches on efforts by the industry (both aircraft operators and manufacturers), a chronological review of these extensive efforts demonstrates the industry's commitment. In June 1988, following the Aloha B737 event, the FAA convened an international conference to address various issues related to aging aircraft, including their maintenance and inspection. As a result of this conference, the Aging Aircraft Task Force (AATF), comprised of technical personnel from the FAA, airlines, aircraft manufacturers and other aviation industry representatives, was formed. The AATF identified the 11 oldest and most widely used large transport category airplanes as the priority fleets for evaluation, and then identified modifications and inspections necessary to ensure the structural integrity of these 11 models. The procedures

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<sup>14</sup> NTSB release SB-03-08, March 18, 2003

<sup>15</sup> 67 Fed. Reg. 72726.

<sup>16</sup> 67 Fed. Reg. 72727.

<sup>17</sup> 64 Fed. Reg. 16298, Notice No. 99-02.

were mandated through the issuance of Airworthiness Directives by FAA. In 1992, the AATF became an element of the FAA's Aviation Rulemaking Advisory Committee (ARAC), and was re-designated as the Airworthiness Assurance Working Group (AAWG) under the Transport Airplane and Engine Issues Group (TAEIG). The AAWG developed the common program elements for the Corrosion Prevention and Control Programs (CPCP) to ensure a uniform approach across models; FAA mandated these elements via airworthiness directives.

In March 1992, the AAWG's Repair Assessment Sub-Task Group performed an external survey of 30 retired airplanes, finding that 85% of the repairs of importance to structural integrity occurred on the fuselage pressure boundary. In 1993, the AAWG recommended that FAA revise AC 91-56, "Supplemental Structural Inspection Program for Large Transport Category Airplanes," to include information necessary to conduct an audit for Widespread Fatigue Damage. In 1998, the FAA accepted these recommendations and published them in AC 91-56A. AAWG's examination of existing maintenance programs for the 11 "aging" model transports resulted in the 1993 publication of ATA's "Structural Maintenance Program Guidelines for Continuing Airworthiness" (ATA Report 51-93-01). The FAA did not mandate these guidelines. In June 1994, the AAWG's Repair Rule Writing Task Group performed a second survey (of in-service airplanes) by aircraft manufacturer and operator teams, and confirmed the results of the first survey. In 1998, the AAWG was tasked to develop a method to evaluate existing airplane repairs to determine whether they were acceptable permanent repairs incorporating damage-tolerance techniques. AAWG decided to limit the scope of repair assessment to fuselage pressure boundary for two reasons. First, the fuselage is more sensitive to fatigue than the rest of the structure because its normal operating loads are closer to its design limit loads; and second, the fuselage is more prone than other parts of the airplane to accidental damage from ground equipment. Subsequently, the Repair Assessment Rule was issued by FAA, effective May 2000.

In 2003, AAWG provided input on rules and advisory materials for the prevention of Widespread Fatigue Damage in Commercial Transport Aircraft. FAA rulemaking based, in part, on this input is expected soon. On January 21, 2003, the AAWG submitted a report entitled, "Recommendations for Regulatory Action to Enhance Continued Airworthiness of Supplemental Type Certificates." This was in response to the FAA's formal tasking of ARAC, in March 2001, to study the effects of multiple complex structural supplemental type certification (STC) modifications installed on transport category airplanes. In addition to these accomplishments, since its charter in 1989, the AAWG has provided extensive aging airplane research program guidance, to FAA funded research and development programs administered through the William B. Hughes Technical Center, particularly in the critical area of nondestructive testing development.

These significant accomplishments demonstrate the major role of the airlines, working individually and through the AAWG, as well as in partnership with the FAA, in each critical step of the FAA/industry aging aircraft program. Their efforts and the comprehensive maintenance and inspection programs now in place demonstrate the considerable expertise the airlines and the OEMs bring to this process. As discussed in these comments, these are among the reasons the AAWG is the logical forum for the development of efficient, standardized damage-tolerance based protocols.

***C. If ATA's recommendations are adopted, efficiency will be enhanced and significant costs will be avoided without any compromise to program components.***

In order to better understand the scope, as well as the financial and operational impact, of the requirements, ATA surveyed its members on the projected estimated compliance costs. Survey results demonstrating the complexity of the implementation effort and supplementing FAA's cost analysis are attached as Exhibit A. We estimate a projected cost impact on the U.S. industry, as extrapolated from the ATA survey, of close to \$3 billion (20 year, undiscounted), an impact considerably higher than the FAA's estimate.<sup>18</sup> Costs can be reduced an estimated 38% if our recommendations are adopted concerning the scheduling of the new inspections at the appropriate maintenance visit and development of DT based guidance by the AAWG, as opposed to OEM review of existing RAMs on a piecemeal basis. A comparison of the cost assumptions by FAA and ATA, as well as brief comments on FAA's benefits analysis, are attached as Exhibit B.

### **III. ATA Recommendations**

**A. Inspections of aircraft and records should be aligned with existing FAA inspection mandates and FAA-approved carrier maintenance programs.** The IFR requires individual aircraft and records inspections in staggered baseline years (beginning in 2007) and at seven-year intervals thereafter.<sup>19</sup> In guidance issued after the IFR, FAA advises that the aircraft inspections must be comparable to a heavy maintenance check, with a minimum 14-day downtime.<sup>20</sup> Neither the inspections at seven-year intervals nor the length of the inspections is mandated by the Aging Aircraft Safety Act.

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<sup>18</sup> The ATA survey was conducted in March 2003, with 11 member airlines submitting data. A conservative extrapolation factor was applied to these estimated costs, including the variations due to the unique operating environment at individual carriers, to extrapolate them to a U.S. industry-wide number.

<sup>19</sup> FAA relies on ATA Memorandum 96-AE-014 to justify repeat inspections at 7-year intervals. 67 Fed. Reg. 72732. Information in that memorandum, documented in ATA Specification 111 "Airworthiness Concern Coordination Process," which FAA partially relies upon to justify selecting a particular repeat interval, was developed for a specific use, and was never intended to apply to FAA operating rules. Specifically, ATA Specification 111 states, "*Ideally, recommended compliance periods will be consistent with maintenance phase check programs of the affected operators, e.g., 'intermediate' and 'heavy' checks. However, the frequency and aircraft downtime for these checks will vary between operators, and the resolution of the ideal compliance schedule is likely to be cumbersome. Therefore, ATA members have agreed to recognize that, for purposes of drafting service bulletins and airworthiness directives, a nominal 'intermediate' check described by an interval of 18 months and an aircraft downtime of one-to-three days should be considered. Similarly, a nominal 'heavy' check may be described by an interval of 60 months and an aircraft downtime of four to ten days.*" (emphasis added) It is inappropriate to rely on these agreed upon intervals for the narrow purposes specified in Spec 111 in a completely different context such as this rulemaking.

<sup>20</sup> Supplemental guidance dated March 10, 2003.



Our members are committed to full compliance with the inspection requirements. In the IFR, the FAA repeatedly states its desire not to disrupt existing carrier maintenance programs and to facilitate efficient, cost-effective compliance with the proposed requirements. We fully support FAA's recommendation for operators to work with their PMIs to "agree on which inspection examines the largest portion of the plane. The operator can make the airplane available to the FAA during that inspection..."<sup>21</sup> Depending on various factors, the most appropriate inspection could be a Heavy Maintenance Visit (HMV) or any one of a number of intermediate inspections or visits incorporated in existing schedules.<sup>22</sup>

By including the new aging aircraft protocols in inspections already scheduled, the requirements in the IFR (for the threshold inspection and repeat inspections) will be fulfilled with absolutely no erosion of the efficacy. In addition, two significant problems will be eliminated:

- **Potential conflicts with existing maintenance inspection requirements would be addressed.** Over the past decade, carrier maintenance programs have been modified to accommodate various aspects of FAA's aging aircraft program. For example, while the CPCP is generally predicated on calendar time, many existing FAA-approved intervals equate to 8-10 years, which will conflict with the proposed seven year repeat interval. FAA's SSIDs and the Repair Assessment Rule are based on aircraft operating cycles. Many OEM-recommended structural task intervals in the FAA-approved Maintenance Review Board exceed the equivalent seven years. By permitting the PMI or DAR and the carrier to incorporate the aging aircraft protocols into the appropriate maintenance check, the potential conflicts can be addressed.
- **Extensive changes to some maintenance programs would be required to reschedule HMVs.** Several carriers use FAA-approved maintenance programs for certain aircraft types that do not include HMVs prior to 2007 or every seven years. If FAA requires the aging aircraft inspections at HMVs (rather than at appropriate intermediate checks agreed to by the PMI or DAR and carrier), these carriers would need to overhaul their existing HMV schedules and establish new inspection lines at a potential cost of over \$500 million dollars.<sup>23</sup>

Modifications to carrier maintenance programs involve a highly complex process. The process must be harmonized with FAA approved maintenance schedules as well as the carrier's operating rules, operating environment, and aircraft utilization, all of which are unique to each

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<sup>21</sup> 67 Fed. Reg. 72730.

<sup>22</sup> We recognize that the Aging Aircraft Safety Act, 44717(b)(1), provides for inspections and reviews "as part of each heavy maintenance check of the aircraft." The term "heavy maintenance check" or HMV is a generic description of a very diverse range of maintenance tasks, depending on the designations within individual carrier programs, FAA guidance, and other technical literature. Since the nature of a HMV varies substantially from carrier to carrier, it is more efficient and focused to use the appropriate maintenance check, whatever its designation by the carrier.

<sup>23</sup> Three ATA member airlines would be impacted under this scenario. A detailed explanation of these costs is in Exhibit A, Inspections, point 7.

carrier. In addition to reducing the disruption of existing programs, the flexibility we propose will assist the FAA and the carriers with significant scheduling and staffing issues related to the mandatory inspections of thousands of aircraft within the next few years.

**Cost Implications:** As noted earlier, we offer projected estimates of compliance costs to illustrate the complexity of implementation and to supplement the FAA's cost analysis (Exhibit A). As indicated in the IFR, changes to maintenance schedules and the records review required by the new inspection protocols will require additional resources, professional staffing, aircraft downtime, and related costs to the carriers. All estimates reflect many factors that vary from carrier to carrier, resulting in wide swings in the projected costs.

Certain components, however, are generally consistent across the industry. For example, a maintenance representative will be dedicated to the aging aircraft inspector and an engineering representative will be available for consultation as needed. Depending on the amount of time added to the scheduled maintenance check, projected estimated costs for these employees range from \$71 million to \$106 million for the industry. Estimated projected costs for the preparation and production of maintenance records and related data range from \$18 million to \$45 million, depending primarily on the nature of the repairs for which documentation must be produced. Estimated costs for the two additional days (projected) that the aircraft will be out of service are \$446 million. In addition, as indicated above, if FAA requires aging aircraft inspections at HMMVs (rather than at the most appropriate inspection as determined by the PMI or DAR and carrier), three carriers will need to overhaul existing HMMV schedules for certain aircraft. If an agreed upon interim inspection can be used, the estimated potential cost of over \$500 million is eliminated.<sup>24</sup>

**Recommendation:** The new aging aircraft inspections and records reviews should be aligned with existing carrier maintenance schedules, at the appropriate maintenance visit as agreed upon by the PMI or DAR and carrier.<sup>25</sup> Comparable processes are contained in FAA guidance material, and subsequent training should utilize the existing guidance in the "Airworthiness Inspectors Handbook," FAA Order 8300.10, Volume 3, Chapter 2, paragraph 13, entitled, "Structural Spot Inspections."

**B. Although the airlines will help FAA with the development of training materials and inspection guidance, compliance dates for inspections of aircraft and records may need to be adjusted.** The current effective date for the final rule is December 8, 2003. Depending on the number of years an aircraft is in service, aircraft and records inspections must be completed sequentially by 2007. In guidance issued after the IFR, the FAA indicated that the requisite guidance for inspections (i.e., incorporating DT based protocols) will not be issued, and the requisite training for inspectors will not be completed, prior to June 2004.<sup>26</sup>

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<sup>24</sup> See Exhibit A.

<sup>25</sup> In our opinion, this can be implemented by FAA issuance of appropriate guidance without amending the IFR.

<sup>26</sup> Supplemental Guidance dated March 10, 2003.

As of December 5, 2003, ATA member airlines expect to operate over 4,700 airplanes that are subject to the required aircraft inspections and record reviews. Fourteen percent (14%) of these airplanes must be inspected by December 5, 2007, for an average of fourteen (14) inspections per month over the intervening four years; thirty percent (30%) must be inspected by December 4, 2008, for an average of twenty-three (23) inspections per month over the intervening five years.<sup>27</sup> Including those airplanes that have not yet but will soon exceed fourteen (14) years in service, the proposed compliance schedule would require FAA inspections of approximately fifty (50) airplanes per month for the initial compliance dates and for the duration of the rule. With thousands of aircraft and detailed maintenance records to be inspected in the next four or five years, an early start on these inspections could reduce the monthly workload, and a late start could increase it.

With our extensive knowledge of maintenance procedures and inspection techniques, we appreciate the tremendous effort that will be required by FAA to develop comprehensive training materials and inspection guidance as well as to train the inspectors and establish a certification program. Unfortunately, if FAA develops the necessary procedures and completes the training of a sufficient number of inspectors, by June 2004, six months of the current compliance period will be lost. Based on our survey, at least three hundred (300) airplanes could have been inspected between December 2003 and June 2004 (now scheduled for HMV or other periodic maintenance inspections during that time frame).

ATA fully supports development of the inspection protocols at an accelerated pace. To facilitate this effort, as early as May 23, 2003, our members will make three prototype aging aircraft available for FAA's use as well assistance from technical experts within the carriers and the AAWG.<sup>28</sup> We believe this joint FAA/industry (airline and airframe/engine manufacturers) team is in the best position to:

- outline proposed inspection procedures and training materials;
- conduct inspections on three prototype airplanes;
- conduct corresponding records reviews;
- amend the procedures as required to enable compliance with the final rule; and
- prepare guidance material suitable for use to train inspectors.

**Cost Implications:** As described in our discussion about the need for flexibility in the scheduling of the new inspections, the carriers will incur substantial costs in implementing these requirements. A significant additional cost will be incurred if the FAA, due to resource

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<sup>27</sup> In March and April 2003, ATA surveyed its member airlines as to the approximate number of aircraft in each impacted category. Eighteen carriers, operating an estimated 4640 airplanes on the effective date of the IFR, responded to the survey; 657 aircraft (14%) were identified as being effected by 121.368(b)(1); 1376 aircraft (30%) by 121.368(b)(2); 2607 aircraft (56%) by 121.368(b)(3).

<sup>28</sup> In late May 2003, a US Airways B-767 will be available in Charlotte, N.C. for a team of FAA and industry experts to begin this effort.

constraints or other unexpected hurdles, is unable to train a sufficient number of inspectors and the carriers must retain and pay inspectors (or DARs).<sup>29</sup> Our survey estimates that a minimum of forty-four (44) inspectors or DARs will be needed to perform the required fifty (50) inspections per month.<sup>30</sup> If the carriers were required to retain these DARs, the projected estimated cost is \$168 million. This potential expense to the carriers is eliminated if the FAA is able to provide sufficient trained inspectors.

**Recommendation:** If, despite the best efforts of the FAA and the carriers, aircraft inspections and records reviews cannot begin on December 8, 2003, the timing of the inspections and reviews should be indexed to the availability of trained FAA inspectors. Using this start date, all inspections and reviews must be completed within 48 months, the compliance period designated in this IFR, for airplanes addressed by Section 121.368 (b)(1), and correspondingly greater times for airplanes addressed by Sections 121.368 (b)(2) and (b)(3). The nature of the inspections and reviews should be aligned with the availability of the required DT guidance as explained in the recommendation below.

**C. The AAWG, an existing Aviation Rulemaking Advisory Committee, should be tasked with development of damage tolerance based standard approaches and guidance to fill existing voids.**

**DT techniques are widely utilized today but there are significant gaps.** As indicated, many diverse programs, regulations, voluntary efforts and FAA mandates govern maintenance programs relating to aging aircraft. Many contain DT inspection and assessment techniques, resulting in incorporation of DT procedures for maintenance of the baseline structure, and all RAMs to the pressure boundary for most aircraft types. In addition, FAA TAD has proposed a standard process for issuing SSID ADs that ATA supports. But there are significant gaps in DT guidance available for most airplanes today such as RAMs on non-pressure boundary structures, and alterations and modifications on some pressure boundary structures. The tedious process that will be required to fill those gaps is complex, labor intensive, costly and time-consuming. While ATA has a proposal for developing the guidance, involving a cooperative effort with FAA and

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<sup>29</sup> While ATA is willing to ask Congress to make sufficient funds available for the training and certification of FAA inspectors to conduct the proposed aircraft and records inspections, there is no assurance that funds will be available.

<sup>30</sup> In an effort to quantify the workload, ATA members estimate that, on average, 40 hours of inspector time will be needed for each records review; 80 hours will be needed for each airplane inspection; and 10 hours for administrative processing; totaling 130 hours per aircraft. This effort, required for 600 airplanes per year, indicates a total annual hour requirement of 78,000. As a rule-of-thumb, the average one-shift-per-day worker generates 1,760 hours annually; therefore, 78,000 hours is equivalent to 44.3 inspectors. ATA estimates assume: (1) inspections apply only to portions of the airplane that are scheduled to be open, and there will be no requirement to inspect an entire airplane at one visit; and (2) in the repeat inspections, there will be no need to revisit the paperwork and history of repairs that have been previously checked. Otherwise, the cost of these inspections will be much higher, and increase with each cycle of inspection.

the OEMs, the completion of that effort will be too late to be used in the inspections that should begin on December 8, 2003 to meet the current compliance dates.<sup>31</sup>

FAA, while acknowledging that DT guidance does not exist for all aircraft structure covered by the IFR, has established a deadline of December 5, 2007 for operators to have all airplanes under DT-based maintenance programs. This mandate is problematic as FAA has underestimated the degree to which DT-guidance is lacking, and the magnitude of the effort to fill the voids. An account of the DT-guidance that is and is not available for most of the current fleet types is as follows:

**Boeing 727 (pre-amendment 45; 225 airplanes in ATA member fleet, all in group 121.368(b)(1) or (b)(2)):**

Baseline structure – DT guidance available. Supplemental inspections have been mandated by SSID AD at identified locations.

Repairs, alterations and modifications – DT guidance available for the fuselage pressure boundary, and areas addressed by the SSID ADs; some for other fuselage structure, wings, empennage, etc. Repair assessments on the pressure vessel are being conducted in accordance with FAR Section 121.370, Repair Assessment for Pressurized Fuselages, on a cycle-based schedule related to the Design Service Goal (DSG) of the airplane (typical of all pre-amendment 45 airplanes in the ATA member fleet).

**Boeing 737 (988 pre-amendment 45 airplanes and 306 post-amendment 54 airplanes<sup>32</sup> in the ATA member fleet, 43 percent in group (b)(1) or (b)(2)):**

*Pre-amendment 45 airplanes:*

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<sup>31</sup> FAA is imposing requirements on airlines before the necessary tools are in place to accomplish the necessary tasks. As noted earlier, the compliance period for inclusion of DT based protocols is problematic because the time required to develop these protocols will consume most of the initial compliance period for aircraft and records inspections. Although we believe our recommendations address the concerns, the fact remains that the IFR requires inspections that, in order to meet the compliance dates, must begin before the necessary prerequisites, either trained FAA inspectors or DT protocols, are provided by those parties over which the airlines have no control. We offer in these comments a proposal for implementing DT-based protocols on a sliding basis that would be developed by AAWG and resolve the dilemma presented by the IFR. But this rule is of the type that has come to be known as a “DCPI rule,” a rule that requires simultaneous completion of Design, Certification, Production and Installation with a near-term compliance date. Such rules place tremendous burdens on the carriers because they have control of only the Installation phase, and others – who have no regulatory deadlines placed on them – are responsible for Design, Certification and Production. We urge FAA, in finalizing this rule, and in all its rulemaking, to index compliance dates for airlines to the date(s) upon which prerequisite steps are completed by other parties.

<sup>32</sup> Amendment 25-54, issued in 1980, required that the airframe maintenance manual be provided for structure certified as damage tolerant. These instructions appear in maintenance planning documents for the 737 NG, 757, 767 and 777.

Baseline structure – DT guidance available. Supplemental inspections have been mandated by SSID AD at identified locations on –100 and –200 series airplanes, but not on the –300, -400 and –500 airplanes (no SSID on the latter at this time).

Repairs, alterations and modifications – DT guidance available for the fuselage pressure boundary, and areas addressed by the SSID ADs, for only the –100 and –200 airplanes; engine struts for the –300, -400 and –500 airplanes (DT at certification); none for other fuselage structure, wings, empennage, etc.

No SRM guidance yet published for –300, -400 or –500 pressure vessel or other structure.

*Post-amendment 54 airplanes:*

Note: Only the portions of the airplane that embody new or significantly modified structure compared to earlier 737 models were certified to the damage-tolerance rule of FAR Part 25.

Baseline structure – DT guidance available. Supplemental inspections identified in the Airworthiness Limitations Section of the Maintenance Planning Document.

Repairs, alterations and modifications – DT guidance not yet available for pressure vessel or other structure.

**Boeing 747 (139 pre-amendment 45 airplanes in the ATA member fleet; 65 percent in group (b)(1) or (b)(2)):**

Baseline structure – DT guidance available. Supplemental inspections have been mandated by SSID AD at identified locations.

Repairs, alterations and modifications – Engine strut-to-wing attachment certified to the DT rule for later 747s, i.e., after line position 1046; guidance otherwise available only for the fuselage pressure boundary; none for other fuselage structure, wings, empennage, etc.

**Boeing 757 (627 post-amendment 45 airplanes in the ATA member fleet; 24 percent in group (b)(1) or (b)(2)):**

Baseline structure – DT guidance available. Supplemental inspections identified in the Airworthiness Limitations Section of the Maintenance Planning Document.

Repairs, alterations and modifications – DT guidance available for the fuselage pressure boundary; none yet published for other fuselage structure, wings,

empennage, etc.<sup>33</sup> For the pressure boundary, many existing repairs are permanent repairs; some repairs need supplemental inspections, in which case inspection thresholds are nominally at 75% of the Design Service Objective after the repair has been installed.

**Boeing 767 (360 post-amendment 45 airplanes in the ATA member fleet; 35 percent in group (b)(1) or (b)(2)):**

Baseline structure – DT guidance available. Supplemental inspections identified in the Airworthiness Limitations Section of the Maintenance Planning Document.

Repairs, alterations and modifications – DT guidance available for the fuselage pressure boundary; none yet published for other fuselage structure, wings, empennage, etc. For the pressure boundary, many existing repairs are permanent repairs; some repairs need supplemental inspections, in which case inspection thresholds are nominally at 75% of the Design Service Objective after the repair has been installed.

**Boeing 777 (131 post-amendment 45 airplanes in the ATA member fleet; none in group (b)(1) or (b)(2)):**

Baseline structure – DT guidance available. Supplemental inspections identified in the Airworthiness Limitations Section of the Maintenance Planning Document.

Repairs, alterations and modifications – DT guidance available for all primary structure.

**Douglas DC-8 (78 pre-amendment 45 airplanes in the ATA member fleet; all in group (b)(1) or (b)(2)):**

Baseline structure – DT guidance available. Supplemental inspections have been mandated by SSID AD at identified locations.

Repairs, alterations and modifications – DT guidance available only for the fuselage pressure boundary; none for other fuselage structure, wings, empennage, etc.

**Douglas DC-9 (268 pre-amendment 45 airplanes in the ATA member fleet; all in group (b)(1) or (b)(2)):**

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<sup>33</sup> Boeing advises that additional guidance for 757s and 767s is targeted for publication in late 2004.

Baseline structure – DT guidance available. Supplemental inspections have been mandated by SSID AD at identified locations.

Repairs, alterations and modifications – DT guidance available only for the fuselage pressure boundary; none for other fuselage structure, wings, empennage, etc.

**Douglas DC-10 and MD-10 (112 pre-amendment 45 airplanes in the ATA member fleet; all in group (b)(1) or (b)(2)):**

Baseline structure – DT guidance available. Supplemental inspections have been mandated by SSID AD at identified locations.

Repairs, alterations and modifications – DT guidance available only for the fuselage pressure boundary; some limited amount of guidance is available for other fuselage structure, wings, empennage, etc.

**McDonnell Douglas MD-11 (70 post-amendment 45 airplanes in the ATA member fleet; none in group (b)(1) or (b)(2)):**

Baseline structure – DT guidance available. Supplemental inspections identified in the Airworthiness Limitations Section of the Maintenance Planning Document.

Repairs, alterations and modifications – DT guidance available for all primary structure.

**McDonnell Douglas MD-80 (553 pre-amendment 45 airplanes in the ATA member fleet; 57 percent in group (b)(1) or (b)(2)):**

Baseline structure – DT guidance available. Potential supplemental inspection requirements have been developed by Boeing but not yet mandated by FAA.

Repairs, alterations and modifications – DT guidance available only for the fuselage pressure boundary; none for other fuselage structure, wings, empennage, etc.

**McDonnell Douglas MD-90 (16 post-amendment 45 airplanes in the ATA member fleet; none in group (b)(1) or (b)(2)):**

Baseline structure – DT guidance available. Supplemental inspections identified in the Airworthiness Limitations Section of the Maintenance Planning Document.



Repairs, alterations and modifications – DT guidance available for all primary structure.

**Airbus A300 (5 pre-amendment 45 airplanes in the ATA member fleet, all in group (b)(1) or (b)(2)):**

Baseline structure – DT guidance available. Supplemental inspections have been mandated by SSID AD at identified locations.

Repairs, alterations and modifications – DT guidance available only for the fuselage pressure boundary; none for other fuselage structure, wings, empennage, etc. Modifications of which the OEM is aware are all DT compliant.

**Airbus A300-600 (44 pre-amendment 45 and 64 post-amendment 45 airplanes in the ATA member fleet, 32 in group (b)(1) or (b)(2)):**

Baseline structure – DT guidance available. Supplemental inspections have been mandated at time of aircraft certification.

Repairs, alterations and modifications – DT guidance available for approximately 5 percent of the fuselage pressure boundary repairs; none for other fuselage structure, wings, empennage, etc. Modifications of which the OEM is aware are all DT compliant.

**Airbus A310 (51 post-amendment 45 airplanes in the ATA member fleet, 49 in group (b)(1) or (b)(2)):**

Baseline structure – DT guidance available. Supplemental inspections have been mandated at time of aircraft certification.

Repairs, alterations and modifications – DT guidance available for approximately 5 percent of the fuselage pressure boundary repairs; none for other fuselage structure, wings, empennage, etc. Modifications of which the OEM is aware are all DT compliant.

**Airbus A319, A320 and A321 (499 post-amendment 45 airplanes in the ATA member fleet, 21 in group (b)(1) or (b)(2)):**

Baseline structure – DT guidance available. Supplemental inspections have been mandated at time of aircraft certification.

Repairs, alterations and modifications – DT guidance available for approximately 15 percent of the fuselage pressure boundary repairs and 15 percent of repairs on

other fuselage structure, wings, empennage, etc. Modifications of which the OEM is aware are all DT compliant.

**Airbus A330 (15 post-amendment 45 airplanes in the ATA member fleet, none in group (b)(1) or (b)(2)):**

Baseline structure – DT guidance available. Supplemental inspections have been mandated at time of aircraft certification.

Repairs, alterations and modifications – DT guidance available for all primary structure.

**Alterations and Modifications – All Aircraft:**

Numerous alterations and modifications have been accomplished on airplanes by operators or STC holders with little damage tolerance guidance published to support the requirements of the IFR.<sup>34</sup> A complete audit of this situation has not been conducted, but airlines are of the view that the vast majority of STCs have no damage-tolerance guidance. Such developers of STCs are typically ill equipped to develop damage tolerance guidance, and some such developers may no longer be in business. This circumstance affects all aircraft manufacturers and all operators to various degrees, and it is an industrywide issue.

**Airlines are not equipped to develop DT guidance.** The OEMs possess the requisite technical expertise, proprietary data, and systemic procedures in place to develop the required DT guidance. Representatives from Boeing and Airbus indicate that development of the required guidance will require a minimum three-year effort. As noted below, their participation in the AAWG is invaluable and will enable the AAWG to develop the standardized approaches and work simultaneously with Boeing and Airbus to develop the aircraft specific guidance for incorporation into maintenance procedures and manuals. Although the operators will participate fully in all aspects of the AAWG's effort, they are simply not equipped (either individually or as a group) to undertake this effort.

The experience of one ATA member offers insight into the tremendous technical, logistical, and financial hurdles involved. It clearly demonstrates the inability of an individual carrier to develop the requisite guidance independent of the OEMs and the AAWG. In the early 1990s, during the negotiations with an OEM for an aircraft purchase, the airline obtained the right to access and use the engineering design data needed for development of DT-based guidance in a

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<sup>34</sup> In AAWGs examination of STCs, it was determined that there are over 10,000 STCs on FAA's database. Of these about 1/3 may affect primary structure in some way (examples range from fuselage penetrations for antennas, to galley installations that affect floor structure or possibly the fuselage shell). This could result in approximately 3,300 STCs needing DTA. Additionally, AAWG found that 168 STCs were "complex" affecting or creating PSEs (examples of these are passenger to freighter modifications, weight increases, and re-engine modifications).

limited portion of a single aircraft type for future repairs only. In order to develop the guidance, over the past decade the airline has dedicated seven engineers, all with engineering doctorate credentials, and several dozen technical support staff to the effort. With these technical resources and a yearly budget of four million dollars, they are now able to perform DT assessments of certain repairs on a piecemeal basis only.

Despite this substantial commitment, the airline has been unable to generate a DT based Structural Repair Manual (as the OEM typically does) or any sort of programmatic approach, and, most significantly for this proceeding, has been unable to develop the guidance required to assess the thousands of existing repairs. Admittedly, this effort is inefficient, limited in potential, and extremely costly.<sup>35</sup> Likewise, it is not the solution for an aviation system comprised of over 100 Part 121 carriers operating over 24 different aircraft types. Not only the industry, but also FAA as overseer of this guidance development, needs a standardized approach.

Certain STCs have been developed without the support of the OEM. To do so, the applicant must undertake – depending on the scope of the modification - a monumental analytical effort to not only develop from scratch the airplane load spectrum, but also exercise very large and complex computer analyses to derive the crack growth data necessary to support the DT analysis. Such efforts are extremely time consuming and, when one considers the prospects of airlines undertaking such attempts individually and without coordination, ill conceived not just for industry parties but also for FAA inspectors charged with overseeing and ultimately approving all these efforts.

**OEMs cannot accommodate piecemeal DT analysis of RAMs.** In the absence of general Structural Repair Manual (SRM) guidance initiated within the AAWG, the only alternative available to airlines for analyses of repairs, alterations and modifications would be piecemeal analyses performed by the OEMs. Due to the volume of repairs that would require OEM review, there is a serious question as to whether the OEMs can accommodate them. Airlines estimate that existing repairs needing DT assessments under the IFR average 31 per airplane, and new repairs will accrue at the rate of 3.3 repairs per airplane per year. These are just the repairs for which no DT guidance is currently available, and which will require piecemeal DT assessments by the OEM.

Boeing representatives indicate that there are 3,100 airplanes of U.S. registry for which they may have to provide such DT assessment support.<sup>36</sup> Boeing also indicates that, on average, two days effort are required for each repair. Over the four-and-one-half-year period from now until December 2007, Boeing would presumably be required to provide DT analysis for 142,600 repairs, requiring 288 person-years of effort per year. Boeing states that it is not in a position to support such a large effort. Airbus representatives indicate that in order to support repair assessments at this rate, its staff would have to be doubled.<sup>37</sup> Airbus also states that it would be

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<sup>35</sup> This type of proprietary data is no longer available from the OEM.

<sup>36</sup> Boeing response to ATA inquiry, 24 April 2003.

<sup>37</sup> Airbus comments to Docket No. FAA-1999-5401, Aging Airplane Safety, April 24, 2003.

impossible to retain adequately qualified, experienced and/or trained staff in time to provide the support necessary to enable airline compliance with the current deadlines.<sup>38</sup> With an effort of such magnitude required by the OEMs to support piecemeal DT assessments, we question whether the OEMs would ever have sufficient staffing to undertake the effort to generate DT-based SRMs.

**In view of these limitations, AAWG is the appropriate technical forum for the development of standardized DT approaches.** The history and accomplishments of the AAWG demonstrate its ability to develop the required guidance in the most efficient, pragmatic process. Its members include technical experts from the major OEMs, airlines and FAA, many with direct involvement in aging aircraft maintenance issues for over a decade. The efficiencies and cost savings from utilization of the AAWG are significant and without question.

The AAWG is prepared to undertake this effort and is willing to do so. At an AAWG meeting on January 21, 2003, the Working Group discussed the IFR and the obvious need for a standardization effort to streamline the process and establish common procedures among OEMs and operators. It decided at that time to make an appeal to the FAA to task the AAWG with the development of DT guidance needed in support of the IFR. At a public meeting hosted by FAA on February 27, 2003, the Chairman of AAWG formally extended this offer to the FAA. Upon questioning, the Chairman of AAWG indicated that the process of developing the needed guidance would need to go forward in two phases, each requiring 18 months, which implied that the compliance date for Section 121.370a should be extended by three or more years. AAWG is also the logical body to apply order and process to the numerous, varied STCs existing in the fleet without a body of damage-tolerance expertise available to develop the needed guidance.<sup>39</sup>

**Recommendation:** In recognition of these facts, the only reasonable approach to implementing the intent of Section 121.370a is for FAA to immediately task AAWG with development of the required DT guidance. If FAA makes this assignment by June 2003, the AAWG will strive to complete its work by June 2006, and airlines will strive to incorporate the guidance into their maintenance programs before 2007. At that time, DT assessments could be performed on new repairs, and existing repairs could be analyzed on a cycle-based formula that AAWG would provide, similar to provisions of the SSID ADs and the Repair Assessment rule.

During this time, airlines and OEMs will be fully engaged on assessment of primary structure and RAMs as governed by the existing SSID ADs, CPCP AD, and the Repair Assessment of Pressurized Fuselages rule. Through the diligent past efforts of FAA and the AAWG, a systematic prioritization of aging aircraft initiatives have been deployed, and will continue to be issued in the future. Damage-tolerance-based maintenance has been a key element of the steps

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<sup>38</sup> Neither comments address the increased staffing and resource dilemma if other governments follow FAA's lead with a damage-tolerance rule, and the number of repairs needing DT analysis grows proportionately.

<sup>39</sup> The AAWG effort, staffed by "volunteers" from FAA, airlines and OEMs, is not without cost. Its members estimate that the additional effort needed to support compliance with the IFR will require 63 man-years of effort valued at \$11 million. See Exhibit A, DT Programs, point 1.

already taken, as is evidenced by Amendment 25-45, the SSID ADs and the Repair Assessment Rule. The repair assessment rule covers all repairs to the fuselage pressure boundary, and the repairs on wings and other aerodynamic surfaces receive an appropriately high level of surveillance.<sup>40</sup> The proposed modification of the IFR will result in no erosion of program safety.

#### **IV. Advisory Circular AC 120-AAR, Aging Airplane Inspections and Records Reviews.**

In the foregoing comments, ATA has requested changes to the IFR and/or FAA policies regarding implementation of the IFR, which need to be carried forward into the supporting advisories. In addition, we suggested the following regarding specific language in draft 120-AAR.

1. Page 4, paragraph 7.b, last sentence: Provisions should be made for FAA acceptance of summaries of records in lieu of actual records. The aircraft inspections may take place at locations remote from the records storage locations, and the transport of records could unnecessarily introduce the risk of damage or loss of records.
2. Page 5, paragraph 7.d.(1)(j): This provision must be clarified to acknowledge that, once inspections begin immediately after December 8, 2003, many repairs may be identified for which there is no damage tolerance guidance available from type certificate (TC) or supplemental type certificate (STC) holders. According to the Chairman of the AAWG, such guidance will not be available for a significant portion of the structure for at least three years. Moreover, under existing ADs and Repair Assessment guidelines for pressurized fuselages, and under SIPs that AAWG is expected to develop for other structure, required repair assessments are linked to the number of flight cycles as a percentage of Design Life Goal. Consequently, airplanes that are over 14 years in service, but have experienced relatively few flight cycles, will not require DT assessment of all repairs during the initial aging aircraft inspections. FAA's interpretations have made this clear.<sup>41</sup>
3. Page 5, paragraph 7.d.(2): This paragraph correctly points out that DT-based inspections may not need to be completed until some date beyond the compliance date of the rule. This is premised on the possibility that a repair assessment made prior to the rule's compliance date may indicate that supplemental inspections need to be initiated at a point in time after the compliance date. As ATA requests in our comments on the IFR above, the recommendations that AAWG is expected to develop for structure which today has no DT guidance available, would also suggest that DSG-based thresholds go beyond the IFR

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<sup>40</sup> Although damage tolerance guidance is available for the fuselage pressure boundary (where AAWGs survey of 1992 found that 85 % of the most significant repairs were located), this does not imply that the effort to produce guidance for the remaining 15 % is simple or easy. Indeed, the nature of the particular structure, namely the critical aerodynamic shape of the wings and empennage, makes this structure much more complex for development of the DT guidance. A major cooperative effort of the FAA, OEMs and airlines through AAWG will be required.

<sup>41</sup> FAA interpretation dated April 28, 2003.

calendar compliance date, and consequently the repair assessments would not need to occur until a later date. We request FAA make the corresponding changes in AC 120-AAR.

**V. Advisory Circular AC 91-56B, Continuing Structural Integrity Program for Airplanes.**

In the foregoing comments, ATA has requested changes to the IFR and/or FAA policies regarding implementation of the IFR, which need to be carried forward into the supporting advisories. In addition, we suggested the following regarding specific language in draft AC 91-56B:

1. Page 3, paragraph 6.a.: It is insufficient for FAA to state that the type certificate holders are “expected to initiate development of a SSIP.” The IFR that was published on December 6, 2002, contained a proposed requirement for operators to incorporate into their maintenance programs a system of damage-tolerance-based inspections and procedures by December 5, 2007. There was no corresponding regulation to require type certificate holders to prepare the SSIPs that are prerequisites for airline compliance with this requirement. For many reasons numerated above, airlines are not equipped to develop the SSIPs, and must rely on TC holders to develop them. FAA must either (a) develop more definite plans than mere expectations to see that TC holders develop the SSIPs on a schedule that matches the requirements for operators to implement them, or (b) index the compliance date for airlines’ implementation to the point in time, whatever it is, that the TC holders complete the development of the SSIPs.
2. Page 4, paragraph 6.f.: The proposed language in this paragraph would require operators to accomplish a damage-tolerance-based inspection program of all major repairs, alterations or modifications to baseline structure in accordance with the timelines established in the “Aging Aircraft Safety” rule. It acknowledges that SSIPs on older airplanes have addressed RAMs that affect Principal Structural Elements, and the Repair Assessment for Pressurized Fuselages rule addressed repairs to the fuselage pressure boundary, but the IFR requires that all major RAMs to the baseline structure be considered. The incorporation of a model specific DT-based SSIP coupled with a model specific DT-based Structural Repair Manual and RAMs DT Guidance Documents will comply with the rulemaking requirements for the OEM-defined baseline structure and all major RAMs to the baseline structure.<sup>42</sup> We support the FAA TAD proposal for standardizing SSID ADs to aid industry compliance with damage-tolerance-based inspections. Moreover, as set forth in our above comments on the IFR, the assessment of major RAMs on primary structure depends upon having the DT guidance available from the TC holders, and there are many voids in this guidance. Moreover, the development of the DT guidance will take at least three years if placed under the management of the FAA Airworthiness Assurance Working Group, and longer otherwise. Completion of the repair assessments must be indexed to the completion of the development of the SSIPs by AAWG, and scheduled according to AAWG’s conclusion about safe

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<sup>42</sup> IFR Preamble, page 72738.

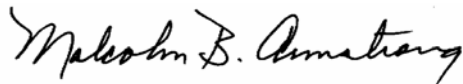
implementation timelines dictated by the nature of the structural configuration of the airplane.

## **VI. Conclusion**

ATA's member airlines are committed to achieving the goals of the Aging Aircraft Act and the IFR. The recommendations in these comments will facilitate compliance with the new requirements in an efficient, integrated process without compromising any of the intended results:

- FAA to align initial and repeat inspections with existing maintenance schedules, with new inspections at the most appropriate HMV or intermediate visit;
- FAA and airlines to work together to develop required training materials for FAA inspectors; if inspections cannot begin in December 2003, compliance dates should be adjusted; and
- FAA to task AAWG with development of DT standardized approaches and guidance, with analysis of existing and new repairs required according to AAWG guidance.

As in the past, ATA and its members will continue to work in partnership with the FAA and the OEMs to ensure the continued airworthiness of all aircraft. We welcome the opportunity to discuss these recommendations with you and to provide any additional data you deem necessary.



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## EXHIBIT A

### Aging Aircraft Cost Analysis and Assumptions

In March and April 2003, ATA surveyed its members on the cost impact of the IFR and eleven members responded, representing 49% of the U.S. industry fleet. There are three main cost components of the IFR: aircraft inspection; airplane and records availability; and development and incorporation of damage tolerance programs. These estimates reflect many variable costs, depending on the nature of each carrier's operation. The evaluation of some cost elements were contingent upon how the IFR is interpreted and the potential requirements of the final rule. In those cases, a best-case scenario estimate and a worst-case estimate were made.

Over the course of these inspections, airlines will try to reduce their costs as much as possible. In some cases, as in the airplane and records availability requirement, ATA was able to make some judgment about how much costs might be reduced on subsequent inspections. In other cases, it was difficult to make assumptions about how costs would be reduced, but it is certain that the carriers will always try to become more cost efficient and will find ways to do so with the final rule.

In order to extrapolate ATA's reporting members' costs to a U.S. industry-wide estimate, costs were allocated to other full-sized jets on an equal prorated per aircraft basis and costs for the smaller regional jets and turboprops were prorated at 25 percent of ATA member per aircraft costs. The smaller escalation factor was based on estimates from carriers who are familiar with their code sharing partners' smaller aircraft maintenance costs. The table below summarizes the projected cost impact of the IFR.

**Aging Aircraft Cost Estimates**  
20 year, undiscounted costs

	<u>11 ATA Respondents</u>		<u>Other Full-Size Jets</u>		<u>Regional Jets and Turboprops</u>		<u>Total U.S. Industry</u>	
# of aircraft	3,743		1,356		2,521		7,620	
# of inspections	9,719		3,521		6,546		19,786	
<u>Inspections</u>	<u>Best Case</u>	<u>Worst Case</u>	<u>Best Case</u>	<u>Worst Case</u>	<u>Best Case</u>	<u>Worst Case</u>	<u>Best Case</u>	<u>Worst Case</u>
Maintenance	46,241,440	69,362,160	16,752,175	25,128,263	7,786,179	11,679,268	70,779,794	106,169,691
Engineering	6,262,770	9,394,155	2,268,853	3,403,279	1,054,531	1,581,797	9,586,154	14,379,231
DARs	126,347,000	126,347,000	45,772,517	45,772,517	21,274,431	21,274,431	193,393,949	193,393,949
Downtime (2 days)	291,570,000	291,570,000	105,628,886	105,628,886	49,094,842	49,094,842	446,293,728	446,293,728
Start-up Lines	199,928,000	199,928,000	72,429,166	72,429,166	33,664,072	33,664,072	306,021,238	306,021,238
Lost Labor	150,284,680	150,284,680	54,444,570	54,444,570	25,305,081	25,305,081	230,034,332	230,034,332
Schedule Changes	-	521,741,905	-	-	-	-	-	521,741,905
<u>Airplane and Records Availability</u>								
Clerk/Engineer	11,549,680	29,515,755	4,184,175	10,692,857	1,944,746	4,969,892	17,678,601	45,178,503
<u>Damage Tolerance Programs</u>								
Development of DT SSIPs	3,696,000	-	-	-	456,835	-	4,152,835	-
Incorporation of DT SSIPs	2,026,580	-	734,182	-	341,238	-	3,102,000	-
RAM Assessment	15,084,290	353,339,200	5,464,680	128,006,400	2,539,908	59,495,600	23,088,878	540,841,200
STCs	11,468,316	11,468,316	4,154,699	4,154,699	7,724,185	7,724,185	23,347,200	23,347,200
<b>Total Cost</b>	<b>864,458,757</b>	<b>1,762,951,171</b>	<b>313,172,876</b>	<b>638,675,337</b>	<b>145,558,411</b>	<b>296,847,442</b>	<b>1,323,190,043</b>	<b>2,698,473,951</b>



## Inspections

### 1. Maintenance

- A carrier maintenance employee(s) will be dedicated to the Aging Aircraft Inspection. This carrier maintenance employee(s) will accompany the FAA inspector or Designated Airworthiness Representative (DAR) during the entire inspection process to open up the aircraft for spot inspections. It is standard practice to assign a carrier representative to accompany and assist an inspector. In addition to the actual opening up of the aircraft, other examples of assistance include providing the inspector with a harness or a stand or support equipment.
- In a best-case scenario, where the inspector only checks areas of the aircraft that are already open at that maintenance visit, a conservative estimate of 80 person-hours per inspection was used for this analysis.
- In a worst-case scenario, if the rule allows the inspector to open up any area of the aircraft, the number of person-hours will increase. It is difficult to approximate what that number will be. One carrier stated that an entire maintenance shift might be dedicated to an inspector if the entire aircraft is subject to inspection (500-600 person-hours). For this analysis, however, ATA more conservatively estimated another week will be added to the best-case scenario, for a total of 120 hours.
- Based on member carriers' current labor contracts, a weighted average hourly labor rate of \$59 was used for maintenance employees.<sup>43</sup>

### 2. Engineering

- An engineering representative(s) will be made available for ad hoc support during the inspection process. The engineer(s) will provide detailed inspection work cards and provide clarification on aircraft repairs. Similar to the dedication of maintenance personnel, in a best-case scenario, where the inspector only checks areas of the aircraft that are already open at that maintenance visit, ATA estimated 10 hours of engineering support would be needed per inspection.
- In a worst-case scenario, if the rule allows the inspector to open up any area of the aircraft, the estimated number of person-hours required will increase to 15 hours.
- Based on member carriers' current labor contracts, a weighted average hourly labor rate of \$64 was used for engineering employees.

### 3. FAA / DAR Inspector

- It is not apparent that FAA will have a sufficient number of trained inspectors to conduct the necessary number of inspections to avoid service disruption. It is likely

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<sup>43</sup> ATA filed comments on the Transponder Continuous Operation NPRM on April 18, 2003. A maintenance labor rate of \$72 was used in that cost analysis. The reason for this discrepancy is that different carriers sent in cost estimates for the Transponder NPRM and this IFR, thus a different average labor rate. Furthermore, an avionics maintenance employee that would be used in a transponder installation is typically paid more than a structures maintenance employee used in an aging aircraft inspection.

that the carriers will have to hire DAR inspectors, at their own cost, to perform the inspections in order to meet the current compliance deadlines.

- Based on inspection procedures already in place, carriers have first-hand knowledge of the steps required in a similar aircraft and records inspection. First, the DAR will need to review the records of the aircraft (40 hours). Second, the DAR will need to plan the inspection (8 hours). Third, the actual inspection will take place (80 hours). Finally, the DAR will complete paperwork (2 hours). An estimated 130 hours will be required for the DAR to complete an aircraft and records inspection. Again, if the inspector requires additional areas to be opened up, the DAR person-hours will increase.
- An hourly labor rate of \$100 was used. This is the hourly rate the carriers pay an external DAR.
- These costs do not include any travel expenses that may be incurred.

4. Downtime

- FAA stated that it expects maintenance visits to be extended two days to accommodate the inspection. FAA estimates cost of airplane downtime based on a rate of return to capital, using the operational airplane as the productive capital and associating a return with its use. This approach is not applicable to what downtime really means for an airline. "Capital" is typically used when purchasing something. In this case, the aircraft is already owned (or is being leased) by the airline. The return associated with its use cannot be estimated by "loss of capital services," as FAA states. The loss is not this loss of capital, but the loss of passenger and cargo revenue. This is different from using capital to invest in something like securities. ATA uses a downtime cost that represents lost revenue net of reduced operating costs.
- Every airline's finance department assigns a value to each aircraft type for a day out of service. This number is based on fixed costs (aircraft lease, insurance, etc.), lost revenue, less operating costs. An extremely conservative estimate of \$15,000 per aircraft per day was used for this analysis.

5. Start-up Lines

- As two days of downtime are added per aircraft, the dock schedule will shift increasingly to the right over 20 years, requiring, in some cases, the start up of additional maintenance lines to maintain the same level of productivity and avoid service disruption. Two carriers said that they would need to add additional inspection lines to their program, costing close to \$200 million over the 20-year period of analysis.
- The need for start up lines at all carriers could increase significantly depending upon the scope of the required inspections, especially if the schedule begins to slip.

6. Lost Labor

- Lost labor is determined on a productivity reduction due to inspections required by the IFR, which will prevent maintenance from being completed. For example, if maintenance work is being done on a door and the DAR wants to inspect the area around the door, the mechanic will have to stop his/her work and wait until the inspector is finished.
- A conservative estimate of 10% productivity reduction was used in this analysis.

7. Schedule Changes to Support Checks at HMVs

- Out of the eleven ATA members responding, eight carriers' heavy maintenance visits for their entire fleet fall within a seven-year interval and will not have to be rescheduled to accommodate the IFR.
- In a best-case scenario, for those carriers whose heavy maintenance visit schedules do not fall within the seven-year interval, FAA will allow them to align the inspection with existing, approved maintenance visit schedules. In this scenario, no additional costs will be incurred.
- In a worst-case scenario, where aircraft will have to be inspected at a heavy maintenance visit, three carriers said that they would need to adjust their schedules to accommodate the seven-year interval requirement of the IFR. The potential total cost for these three carriers of adjusting their maintenance lines to perform the inspections could reach \$521.7 million.
- These carriers would have to either set up new maintenance lines or extend a light or medium check into a heavy check to accommodate the inspection. One carrier would have to set up special maintenance lines to reschedule 118 aircraft that are normally on a HMV interval of more than seven years. Additionally, of this carrier's 209 airplanes requiring inspections by December 8, 2008, approximately 60 will be out of phase with their HMVs and will require special scheduling for the inspections. The result is an overloading of the carrier's existing hangar capacity and maintenance resources. The estimated cost to provide the additional necessary labor is \$121 million.
- The second carrier will extend their light and medium maintenance visits into a full-blown heavy maintenance visit for their 463-aircraft fleet. For example, one fleet's HMV occurs every 11.5 years and requires approximately 13,500 person-hours to complete all the tasks. Ideally, this check is when the aging aircraft inspection would occur. If the seven-year interval is required, the inspection would have to be done at a lighter check occurring every 5.75 years for this fleet type. This lighter check normally requires 6,200 person-hours to complete all tasks and would now be extended to a HMV. This difference in person-hours per inspection (7,300 hours) is the driver behind this carrier's estimated \$330.6 million costs to reschedule HMVs for the seven-year requirement.
- The third carrier's methodology was similar to the second's. This carrier would have to extend maintenance visits for the fleet whose HMVs do not fall within the 7-year interval requirement. This fleet consists of 110 aircraft and the person-hours

difference between a lighter check and a HMT is approximately 1,600 per inspection, totaling an estimated \$33.5 million. This carrier also included \$36.7 million in rental aircraft costs to avoid service disruption.

- ATA conservatively limited these costs to just the three carriers who expressed a need to change their heavy maintenance visit schedules and did not extrapolate this cost estimate to an industry-wide estimate.
- These schedule change costs are different from the start-up line costs mentioned earlier. These schedule change costs are for immediate needs to comply with the IFR. Some carriers will have to start immediately to meet the first inspection deadline. The start-up line costs are for potential long-term needs as the maintenance visit schedules start to slip.

### Airplane and Records Availability

#### 1. Records Preparation and Production and Notification

- The extensive records research and review required when returning an aircraft off a lease is very similar to the proposed requirements in the IFR. Additionally, one airline recently implemented a Significant Findings Report, which is filled out by their quality control department when performing each major repair. This system provides a good means of flagging major repairs and is easily retrieved from the aircraft records system. In this process, the airline was able to accurately account for the number of hours needed to comply with the records review requirement of the IFR.
- In a best-case scenario, where only major repairs are required to be documented, 40 hours were needed to prepare and produce the records for FAA. Aircraft history is not always in one central location or in electronic form. This requirement could involve going to several different sources to compile the necessary information.
- The distinction between "major" and "minor" has always been a source of debate between FAA and the carriers. In a worst-case scenario, where all repairs, alterations and modifications are required to be documented, a total of 90 hours was assumed. Notification to FAA is included in both scenarios.
- These person-hours were assumed for the initial records preparation. Subsequent documentations were assumed to require a third of the initial preparation time.
- An average hourly labor rate of \$50 was used for preparation of records. Some carriers used an engineer to perform this duty, some used a mechanic, and others used a clerk within the maintenance/engineering departments.

### Damage Tolerance Programs

#### 1. Development of SSIP

- If the final rule requires a damage tolerance based maintenance program for the entire aircraft, considerable input would be needed from the manufacturers and the Airworthiness Assurance Working Group (AAWG). As stated in the body of the

comments, AAWG is willing and able to develop damage tolerance guidance. A representative from the AAWG estimates these requirements: 14 task force participants (split between OEMs, operators, and regulatory representatives), 18 five-day meetings, an average of 10 support staff for each task force participant due to the complex nature of the analysis outside the pressure vessel, 8 hours per day at \$100/hour, for a total labor cost of \$11.1 million. The carrier burden of this cost is roughly one-third, \$3.7 million. An additional \$415,000 (prorated at 25% of ATA member per aircraft costs) is estimated to develop damage tolerance guidance for the regional jet and turboprop fleet.

- Without work by AAWG, instead of a damage tolerance program, assessment of all existing and future repairs, alterations, and modifications (RAMs) would require a piecemeal approach by the OEMs.

## 2. Incorporation of SSIP

- If the final rule requires a damage tolerance based maintenance program for the entire aircraft, including all repairs, alterations and modifications, once a damage tolerance program has been established for each fleet type, each carrier will need to incorporate it into their maintenance programs. ATA carriers estimate 100-640 person-hours per fleet type to implement a damage tolerance program into a maintenance program, depending on the fleet type. Each carrier will have to incorporate these new procedures into their existing maintenance programs. This involves updating manuals and work cards, discussions with the OEMs, going back and forth with the records department, and other various tasks.
- If the OEMs provide damage tolerance assessment guidelines per repair, a damage tolerance program would not be required since each repair would be assessed individually.

## 3. RAM Assessment - Existing and Future

- If AAWG is allowed to develop the damage tolerance program, carriers will still need to analyze their existing RAMs. ATA carriers estimate 2 person-hours per RAM at an hourly engineering rate of \$65 for the 31 existing RAMs per full-size jets, based on an ATA carrier survey. Again, for regional jets and turboprops, a factor of 25% was applied to their calculation due to their smaller size.
- If OEMs are to assess each RAM individually, 31 existing RAMs per aircraft will need to be assessed. Boeing has estimated, for its U.S. fleet, employing 16 person-hours per RAM at an hourly labor rate of \$100.<sup>44</sup> ATA used this labor estimate for all full-size jets and applied a factor of 25% for regional jets and turboprops. In addition, ATA carriers estimated an average of 3.5 future RAMs per aircraft per year that will need to be damage tolerance assessed. The estimated cost to assess all existing and future RAMs is \$540.8 million. This estimate excludes additional carrier

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<sup>44</sup> ATA conservatively used the Boeing labor rate of \$100 for all U.S. carriers. ATA carriers stated that this would be an absolute minimum labor rate that Boeing would charge. In fact, Boeing charges \$150 an hour for supporting "lower tier" airlines.

- engineering time to support the OEM analysis. Carrier engineers will need to gather data, write internal paperwork, provide data to the OEM, coordinate requirements and follow-up by implementing final OEM recommendations into the aircraft maintenance program.
- Boeing's labor estimate was applied to all full-size jets in the entire U.S. industry fleet. Airbus was unable to provide a cost estimate to develop damage tolerance assessments of repairs.<sup>45</sup>
4. Supplemental Type Certificates (STC's)
- An AAWG representative stated that there are more than 10,000 STCs on FAA's database. Of these, about one-third may affect primary structure in some way. Examples range from fuselage penetrations for antennas to galley installations that affect floor structure or possibly the fuselage shell. If all STC's are required to be damage tolerance assessed, approximately 3,300 STCs at 80 hours minimum of engineering labor per STC would have to be complete. Additionally, AAWG found that 168 STCs were "complex," affecting or creating PSEs (e.g., passenger to freighter modifications, weight increases, and re-engine modifications). These "complex" STCs would require, at a minimum, 600 engineering hours per STC for damage tolerance assessment.

### Summary

Total estimated undiscounted costs of the IFR in a best-case scenario are \$1.3 billion for the industry over a 20 year period. In a worst-case scenario, potential estimated costs could reach \$2.7 billion.

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<sup>45</sup> Airbus comments filed to the docket on April 24, 2003.

## EXHIBIT B

### Concerns about FAA's Cost Benefit Analysis

While the ATA member airlines fully recognize that cost issues are not determinative in light of the legislative/policy decision underpinning the IFR, it is nevertheless important that we provide a critique of FAA's cost analysis in the hope that analysis in future rulemakings of this nature will include cost elements essential to the implementation of complex maintenance protocols. In addition, we offer comments on FAA's benefits analysis for the same reasons.

**FAA underestimates and overlooks key cost components.** FAA's 20-year cost estimate for this rule is \$362.9 million (\$173.5 million, discounted). While ATA agrees with some of FAA's assumptions, other assumptions underestimate the impact of the requirements and several fundamental tasks/costs are completely overlooked. The table below compares FAA and ATA cost analysis assumptions.

#### **Aging Aircraft Cost Assumptions**

<u>Inspections</u>	<u>FAA *</u>	<u>11 ATA Respondents</u>
Maintenance	97 hours	80-120 hours
Engineering	n/a	10-15 hours
DAR's	36-225 hours	130 hours
Downtime per day	\$3,228	\$15,000
Modification Costs	\$10,200 - \$168,800 per airplane	n/a

#### Additional Inspection Costs (for 20 year period)

Start-up Lines	n/a	\$199.9 million
Lost Labor	n/a	\$150.3 million
Schedule Changes	n/a	\$521.7 million

#### Airplane and Records Availability

Clerk/Engineer	6-30 hours per plane	40-90 hours per plane
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#### Damage Tolerance Programs

Development of DT SSIPs	7,842 hours per affected fleet type	\$3.7 million (AAWG)
Incorporation of DT SSIPs	80 hours per fleet type	100-640 hours per fleet type
Review/Approval by FAA	40 hrs * 91 models * \$55	n/a
RAM Assessment	n/a	[31 existing repairs per aircraft * 16 hours per repair] + [3.5 future repairs per aircraft per year * 16 hours per repair]
STCs	n/a	[3,300 STCs * 80 hours per STC] + [168 "complex" STCs * 600 hours per STC]

**Total Cost (undiscounted)**

**\$362.9 million**

**\$1.3 billion - \$2.7 billion**

\* Based on information from 67 Fed. Reg. 72756-72757 and Preliminary Regulatory Evaluation, June 1997, pp. 7-17.

The following represent the significant differentials:

#### Costs per Inspection

- Although FAA and ATA assumptions about maintenance and DAR hours are comparable, FAA did not take into consideration engineering hours required to support an aging aircraft inspector. An engineer must be made available for ad hoc support during the inspection process to provide detailed inspection work cards and provide clarification on aircraft repairs, as well as any other support required by the inspector.
- As in prior rulemakings, ATA disagrees with the methodology FAA uses to calculate downtime costs. FAA estimates cost of airplane downtime based on a rate of return to capital, using the operational airplane as the productive capital and associating a return with its use. This approach is not applicable to the actual impact of downtime on an airline. "Capital" is typically used when purchasing something. In this case, the aircraft is already owned (or is being leased) by the airline. The return associated with its use cannot be estimated by "loss of capital services," as FAA states. The return associated with its use is passenger and cargo revenue; this is different from using capital to invest, i.e., for securities. ATA uses a downtime cost that represents lost revenue net of operating costs, the same analysis our members used internally.
- ATA does not anticipate a cost related to structural modification costs that FAA assumed would be needed to make certain areas of the airplane inspectable.

#### Additional Inspection Costs

- FAA overlooked three additional areas of costs under inspection costs. First, as two days of downtime are added per aircraft, the dock schedule will shift increasingly to the right over 20 years, requiring, in some cases, the start up of additional inspection lines to maintain the same level of productivity and avoid service disruption. Two carriers said that they would need to add additional inspection lines to their program.
- Second, lost labor is determined on a productivity reduction due to the inspections required by the IFR rule, which will prevent maintenance from being completed. For example, if maintenance work is being done on a door and the DAR wants to inspect the area around the door, the mechanic will have to stop his/her work and wait until the inspector is finished.
- Third, if the FAA does not allow carriers to align their inspections with existing, approved maintenance visit schedules, as opposed to a HMTV, three carriers will need to adjust their schedules. The carriers estimate the total cost of rescheduling maintenance visits is \$521.7 million. The bulk of this cost is the person-hours required to staff new maintenance lines or extend lighter checks to heavy checks. Anticipated costs for rental aircraft to avoid service disruption are included in this estimate.



#### Airplane and Records Availability

- ATA carriers estimate a range of 40-90 hours per plane to perform a records research and review, based on current aircraft lease returns and internal records audit. FAA's range of 6-30 hours seems low compared to actual carrier experience with comparable procedures.

#### Damage Tolerance Programs

- The development of damage tolerance guidance is a tedious, time consuming and costly process, and requires significant input from the OEMs and AAWG. The cost is very difficult to estimate. AAWG has volunteered to spearhead this effort. A representative from the AAWG estimates these requirements: 14 task force participants (split between OEMs, operators, and regulatory representatives), 18 five-day meetings, an average of 10 support staff for each task force participant due to the complex nature of the analysis outside the pressure vessel, 8 hours per day at \$100/hour, for a total labor cost of \$10.1 million. The carrier burden of this cost is roughly one-third, \$3.4 million. An additional \$415,000 (prorated at 25% of ATA member per aircraft costs) is estimated to develop damage tolerance guidance for the regional jet and turboprop fleet.
- FAA estimated 80 hours per fleet type to incorporate a damage tolerance program into the maintenance program of each affected carrier. ATA carriers estimate 100-640 manhours per fleet type to implement a damage tolerance program into a maintenance program, depending on the fleet type. Each carrier will have to incorporate these new procedures into their existing maintenance programs, a comprehensive process, requiring the updating manuals and work cards, discussions with the OEMs, ongoing dialogue with the carrier's records department, and other administrative tasks.
- ATA did not include a cost for review and approval by FAA, since that would be a cost to FAA, not the carriers.
- FAA did not include an estimate for assessing all RAMs. ATA carriers will need to assess an average of 31 existing repairs per aircraft and an estimated 3.5 future repairs per aircraft using the damage tolerance based techniques, depending on the requirements of the final rule.
- FAA did not include an estimate for assessing all existing STCs. An estimated 3,400 STCs that affect the primary structure exist, all of which will require damage tolerance assessments, depending on the requirements of the final rule.

**FAA's benefits analysis is cursory.** Even if the most efficient methods are adopted to ensure the continued safety of aging aircraft, this rule will impose substantial new costs on the airline industry. Yet the FAA has made only a cursory attempt to quantify the benefits that might justify these costs. Although Congress has mandated that the FAA proceed with a rule regarding aging aircraft and that is justification enough for going forward, it is still important to attempt to quantify the benefits in order to evaluate the magnitude of the proposed rule.

The Benefits section of this rule does not calculate benefits. It assumes that as aircraft age, the risks of a structural failure increase “if no preventive actions have been taken”. The “Relative Risk” analysis might, at best, give some guidance as to when aircraft should be inspected but it gives no guidance at all as to the value of this increased scrutiny. ATA’s best case analysis of the aging aircraft regulation suggests that costs will be at least \$1.3 billion. Benefits, clearly, will fall well short of this figure.

FAA regulations already contain a host of requirements regarding fatigue, corrosion and other phenomena related to aircraft aging. Benefits from those regulations cannot be double counted in this proposed regulation. Therefore, since preventive actions have been taken, incremental benefits from this rule will be small. FAA appears to not want to document this shortfall.

Furthermore, FAA acknowledges that the analysis is “not an estimate of actual future estimates,” and that [t]o date, the airplane fleets affected by this rule have not experienced a fatigue-related accident resulting in loss of life or serious injury, although the Aloha accident...partly attributed to the age of the airplane...”<sup>46</sup> Even with these caveats, the FAA continues to focus on the discovery of “cracks” on aircraft. FAA states “A review of Service Difficulty Reports (SDRs) shows that a significant problem exists with cracks on airplanes in the U.S. commercial fleet,” and discusses the 88,000 SDRs on “cracks” since 1990.<sup>47</sup> These reports, however, demonstrate the existing maintenance programs are working. In addition, on the FAA Flight Standards Service (AFS) web site for SDRs, it states, “The number of SDRs submitted on a specific product, or by a particular operator is not an indication on the mechanical reliability, fitness, or safety of that product or operator, and the information should not be used in that manner.”<sup>48</sup> FAA, however, relies on the number of SDRs to justify the need for the requirements in the IFR.

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<sup>46</sup> 67 Fed. Reg. 72753.

<sup>47</sup> 67 Fed. Reg. 72754.

<sup>48</sup> <http://av-info.faa.gov/isdr/default.asp>.